

## **Summary of Session II: Special Issues on ARIES Design and SiC Issues:**

We invited Dr. Rene Raffray of the ARIES team to give us a summary on the design features of the ARIES-ST and ARIES-AT first wall and blanket designs. The ARIES-ST is a low aspect ratio normal conducting TF coil reactor design. The first wall and blanket coolant routing is in the poloidal direction. The maximum neutron wall loading and first wall heat flux are 6 MW/m<sup>2</sup> and 0.6 MW/m<sup>2</sup>, respectively. High power cycle efficiency of >45% is used to offset the high recirculating power in the normal-conducting TF coil system. The first wall is cooled by helium, and the blanket is cooled by Pb-17Li. This dual coolant approach is to uncouple structural temperature of 300-525 C, from the main Pb-17Li coolant temperature of 500-700 C.

The super conducting coil ARIES-AT design has a simpler configuration due to the selection of the single coolant and breeder of Pb-17Li. SiC/SiC composite is used as the structural material for the poloidally oriented module, therefore, no MHD insulation will be needed for this design. The combination of high temperature materials, and with the Pb-17Li at an outlet temperature of 1100 C, allows a gross thermal efficiency of 58.5%. This first wall and blanket system handles a maximum neutron wall loading and surface loading of 4.8 MW/m<sup>2</sup> and 0.34 MW/m<sup>2</sup>, respectively. The SiC/SiC design properties were supported by the recent international SiC/SiC workshop held at Oak Ridge National Laboratory in Jan. 2000. Results of the thermal, structural and neutronics analyses were presented to the APEX team. Possible fabrication procedure of the SiC/SiC module with minimum joints was also proposed and presented to us.